Supply chain resilience for small and medium enterprises: a protection motivation perspective for Italian firms

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Abstract: Recent unpredictable events, such as the COVID-19 pandemic or the Russian-Ukrainian conflict, highlight how supply chains need to improve their resilience to cope with increasing vulnerabilities and risks. Companies have been suggested to adopt proactive approaches towards resilience and to develop their dynamic capabilities, yet we have limited knowledge about why companies adopt (or not) a proactive or reactive approach to supply chain resilience. This especially applies to the context of Small and Medium Enterprises (SMEs), for which this topic is largely underexplored.

This study aims to investigate the attitude of SMEs towards supply chain resilience by interpreting the adoption of proactive or reactive approaches through the lens of the Protection Motivation Theory (PMT). We analysed resilience enablers, i.e., entrepreneurial orientation, innovativeness, and risk management culture, to improve the current understanding of how the dominant mediating processes at the core of PMT affect companies' dynamic capabilities to develop resilience.

We conducted multiple case studies involving a sample of five Italian manufacturing SMEs. Theoretically, our work advances previous knowledge on supply chain resilience by combining the PMT with the dynamic capabilities theory to explain how SMEs develop supply chain resilience. From a practical perspective, we provide SMEs with original understanding of the reasons behind the adoption of proactive or reactive approaches and the development of dynamic capabilities, highlighting the influence of entrepreneurial orientation, innovativeness, and risk management culture.

Keywords: Supply chain resilience, Protection motivation theory, Dynamic capabilities, SMEs, Italy

1. Introduction

The last few years have been characterised by several unpredictable events, such as the COVID-19 pandemic and the Russian-Ukrainian conflict. These events have triggered new and complex conditions across supply chains, stressing the need to develop and strengthen supply chain resilience (Carissimi et al., 2023; Ivanov and Keskin, 2023).

Previous scholars widely investigated the main triggers for and the behaviours and practices supporting resilience, further linking it to the development of dynamic capabilities (Kähkönen et al., 2021; Queiroz et al., 2022). We refer to dynamic capabilities as the capabilities needed within the company and in the supply chain to anticipate and/or manage risks (Lee and Rha, 2016; Teece, 2007). Entrepreneurial orientation, technology orientation and risk management culture were proposed as key enablers to develop dynamic capabilities leading to resilience (Al-Hakim and Borade, 2020; Kumar and Anbanandam, 2020). In this perspective, we relate the capabilities of sensing, seizing, and reconfiguring to the resilience strategies of visibility, agility, and flexibility, respectively (Kilubi, 2016; Lee and Rha, 2016).

Although we have extensive literature on supply chain resilience for large companies, scholars limitedly addressed the problem for small and medium enterprises (SMEs). In this context, the protection motivation theory (PMT) has been proposed as an appropriate theoretical framework to study the reasons behind the decision of companies to adopt either a proactive or reactive approach to resilience (Bode et al., 2021). The PMT represents a valuable theory applicable to "any situations involving threat" (Maddux and Rogers, 1983, p. 172) and can be used to investigate supply chain resilience considering supply and demand disruptions as threats. Consequently, it has been decided to implement empirical research to investigate the attitude of SMEs towards supply chain resilience analysed through the PMT framework. The following research question (RQ) was identified:

- *RQ: How do SMEs improve resilience through the development of their dynamic capabilities?*

We conducted multiple case studies involving a sample of five Italian manufacturing SMEs. We analysed how resilience enablers such as entrepreneurial orientation, technology orientation and risk management culture can affect the development of resilience strategies, namely visibility, agility, and flexibility. We contribute theoretically by combining the PMT with the dynamic capabilities theory to explain how SMEs develop supply chain resilience. We thus provide SMEs with a critical understanding of the factors facilitating the proactive establishment of dynamic

capabilities, highlighting the influence that the enablers have on resilience development.

The paper is organized as follows. Related literature is first presented, followed by the methodology description and the illustration of the results relating to the identified RQ. Results are then discussed, and conclusions are lastly drawn along with proposals for future research.

2. Literature review

2.1 Supply chain resilience

The high level of dynamism of the environment in which supply chains operate exposes them to an increasing number of threats (Yu et al., 2019). On the supply side, potential deviations concerning lead time, quality, and quantity of the incoming supplies may interrupt the upstream flows of the chain (Shekarian and Mellat Parast, 2020). On the demand side, the potential difference between actual and forecasted demand due to high unpredictability, volatility, and market changes, may threaten the successful fulfilment of customer demand (Kilubi, 2016). Moreover, environmental risks such as terrorism, war, diseases or epidemics, natural disasters, social and political grievances make the supply chain scenario even more difficult to be predicted and managed (Samvedi et al., 2013). Supply chains are thus required to increase their resilience to prepare for unexpected damaging events, respond to them and recover after them, eventually moving to a new desirable state of control and connectedness over structure and functions (Ponomarov and Holcomb 2009).

2.2 Resilience enablers for SMEs

The extant resilience literature suggests that entrepreneurial orientation, technology orientation, and the presence of a risk management culture are key enablers to develop supply chain resilience in SMEs.

Having an entrepreneurial orientation allows the company to be defined as "(…) one that engages in product market innovation, undertakes somewhat risky ventures and is first to come up with 'proactive' innovations (…)" (Al-Hakimi and Borade 2020, p.3). Entrepreneurial orientation involves a risk-taking attitude and proactiveness, which indicate respectively the disposition to devote resources to projects whose results are difficult to predict and to anticipate new developments (and opportunities) and seize them before competitors. The role of entrepreneurial orientation in achieving resilience is particularly strong in SMEs which are family owned. In fact, in SMEs that are family businesses "the owners/managers recognize that their family firm's survival depends on their ability to enter new markets and revitalize existing operations to enhance the competitiveness" (Jayaram et al., 2014, p. 473).

The development of a positive orientation towards technology enhances resilience through information sharing, which can increase the awareness of vulnerabilities before the occurrence of a risk and shorten the response time during disruptions. IT infrastructures such as ERP systems can improve supply chain integration, visibility, and monitoring, which are fundamental to quickly reacting and adapting to unexpected changes (Cragg and McNamara, 2018).

Lastly, a risk management culture can be defined as the set of "beliefs and behaviours of firms' employees and management related to risk management" (Kumar and Anbanandam 2020, p. 248). Whenever present, it can enhance the firm's awareness of supply chain disruptions and reduce its vulnerabilities (Bahrami and Shokouhyar 2022).

2.3 Dynamic capabilities

The highly turbulent context in which supply chains operate requires the development of dynamic capabilities to understand the environment, detect possible threats and address them (Kähkönen et al. 2021).

Dynamic capabilities represent "the ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments and to achieve new and innovative forms of competitive advantage" (Teece et al., 1997, p. 516). They include three different types of capabilities named sensing, seizing, and reconfiguring.

Sensing capabilities, aimed at "scanning, detecting, learning and interpreting new opportunities" (Kähkönen et al. 2021, p. 3) and enable firms to identify desired changes in the environment. Sensing is congruent with supply chain visibility, which is fundamental during the anticipation phase of resilience. It reduces complexity and uncertainty allowing "firms to share information with partner organizations and effectively manage and control planning, scheduling and manufacturing" (Lee and Rha, 2016, p. 14).

Seizing capabilities represent the "ability to capture the sensed opportunities or neutralize the threats by creating decision-making procedures and structures" (Kähkönen et al. 2021, p. 4). Seizing is congruent with agility, which is needed during the adaptation and response phases since it improves the response capacity by increasing speed in decision-making (Lee, 2004; Mason et al., 2002; Swafford et al., 2006).

Reconfiguring capabilities are focused on the "alignment and realignment of assets so that the firm can renew and ensure that its resources are in line with the detected changes and sensed opportunities" (Kähkönen et al. 2021, p. 4). Reconfiguring is congruent with flexibility to integrate and recombine resources during the recovery phase, for example through reconfigurations in production, multi-skilled workforce, and flexible supply base (Lee, 2004; Negri et al., 2022; Shekarian and Mellat Parast, 2020).

2.4 Protection motivation theory

PMT is an established, robust theoretical foundation for the analysis and exploration of recommended actions or behaviours to avert the consequences of threats (Johnston and Merrill, 2010). PMT has been used primarily to explain how individuals deal with personal threats, particularly health-related and (information) security-related threats (Bode et al., 2021). However, it can be applied also to supply chain research by considering supply chain disruptions as threats. It can contribute to understanding why companies decide to develop (or not) proactive resilience strategies given the various shocks and disruptive events that hit supply chains (Madhani, 2019).

The dominant mediating processes at the core of PMT are the coping appraisal and the threat appraisal. These two processes comprise variables that increase or decrease the probability of a firm adopting a preventive response (Ifinedo, 2012).

Coping appraisal evaluates the proactive response taken to prevent damages to the supply chain (adaptive response). It includes the evaluation of the effectiveness of adopting a proactive action to neutralize threats and the costs (financial and relational costs) of that action. Conversely, threat appraisal evaluates the maintenance of the status quo (maladaptive response). It accounts on one side for the intrinsic and extrinsic rewards, and on the other side for the severity of the threat, which is the potential amount of physical or economic damage associated with the threat (Bode et al., 2021). Elements within each appraisal process are assumed to summate algebraically into a final appraisal of coping and threat, that is a protection motivation. Generally, high implementation costs make the proactive measure unappealing even if the response efficacy is high, whereas high vulnerability to a threat reduces the relative importance given to implementation costs since the loss caused by the threat might be extremely severe (Ifinedo, 2012).

3. Methodology

To address the RQ we adopted a qualitative methodology based on case study analysis. The case study analysis allows the exploration of a complex phenomenon in its natural environment (Yin, 2018) and it is appropriate to investigate a topic in the early stage of study where the key variables under investigation and their relationships are still not defined (Eisenhardt, 1989).

3.1 Case selection

Cases were selected to maximize the insights provided by the sample (Eisenhardt, 1989). In line with our RQ, we selected five Italian small and medium manufacturing firms. We selected Italy because is one of the five European country with the highest GDP (Ministry of Economy and Finance, 2019). Moreover, SMEs in Italy represent the 80% of the total enterprises, thus they are the backbone of the national economy (ISTAT, 2020). To maximize the heterogeneity of the sample (Saunders, 2009) we selected SMEs operating in different industries. **Table 1** provides details on the characteristics of the sample. For confidentiality reasons, the companies' names have been replaced with alphabetical letters.

3.2 Data collection

Data were collected from September to December 2022 through semi-structured interviews. Each interview was conducted online, lasted about two hours, and was audio recorded. To maximize the interviews' conceptual insights linked to our RQ, we selected as informants the CEO and owner of the company (companies A, B, C, and D) and the company's supply chain director (company E). Moreover, three investigators were involved to enhance the convergence of observations both during data collection and data analysis (Voss et al., 2002).

Table 1: Panel characteristics

	Case A	Case B	Case C	Case D	Case E
Foundation year	1974	1948	1956	1987	1998
Industry	Engineering: domestic appliances	Textile: luxury home accessories	Engineering: food & medical industrial machinery	Engineering: refrigeration industrial isolation	Engineering: life sciences & pharmaceutical
Type of management	Family management	Family management	Family management	Family management	Professional management
Informants	CEO and owner	CEO and owner	CEO and owner	CEO and owner	Supply chain director

The interview guide (available on request) contained an explanation of the general aims of the research and the questionnaire. It was shared in advance with the informants and updated during the interview process (Yin, 2018). The questionnaire is composed of 23 open questions, following the funnel format which starts with generic questions and proceeds with more specific ones. To improve the research's internal validity, the questionnaire was built on the literature categories (Yin, 2018). The interview guide was organized by focusing first on the SMEs' general characteristics, then on the resilience enablers, and finally on the evaluation of the elements of the coping and threat appraisal. The coping appraisal was evaluated by measuring the effectiveness of the company's dynamic capabilities in addressing risks and the cost to implement them proactively. The three dynamic capabilities of sensing, seizing and reconfiguring were linked with the supply chain resilience strategies of visibility, agility, and flexibility. The threat appraisal was evaluated by measuring the economic and physical damage caused by the risk and related to the not adoption of any preventive action. A database was created to collect both primary data from interviews and secondary data coming from the companies' websites, reports, and articles. This improved the study's reliability (Yin, 2018). In this step, the use of categories from the literature and the triangulation of data with secondary sources strengthened the research's construct validity (Ellram, 1996).

3.3 Data analysis and validation

Data was analysed by performing first a within-case analysis, during which the information collected through semi-structured interviews was analysed, standardised, and reduced through open coding (Miles and Huberman, 1994). We conducted a cross-case analysis to transversally look through the cases to find out similarities and differences among cases to identify common patterns and emerging themes (Miles and Huberman, 1994). Information was processed by moving from open to axial coding, building relevant categories and elaborating on the relationships and links among them (Ellram, 1996). We also analysed how resilience enablers can support proactive approaches towards resilience which could leverage or lead to developing the related dynamic capabilities. The cross-case analysis also allowed to examine patterns across different contexts and industries, improving findings' generalisability and strengthening external validity (Voss et al., 2002).

4. Results

Following the interview protocol, results first focus on the factors enabling supply chain resilience in SMEs (**Table 2**). Then, we describe the components of the coping appraisal process through the analysis of the dynamic capabilities developed by SMEs, their effectiveness in proactively coping with risks, and the justification of costs to support their development (**Table 3**). As described above, the development of the three dynamic capabilities of sensing, seizing, and reconfiguring is respectively examined through the development of the supply chain resilience strategies of visibility, agility, and flexibility, according to Lee and Rha (2016). Lastly, the components of the threat appraisal process are evaluated by investigating the vulnerability of SMEs to demand and supply risks and the severity of these risks in terms of physical and economic damages (**Table 4**).

4.1 Resilience enablers

In cases A, B, C, and E informants were keen to seizing new market opportunities and to engaging in innovation even though this involved increasing the risk of project failure. Conversely, the CEO of company D was reluctant to invest in new opportunities, adopting a more conservative attitude. All companies were quite prone to investing in innovation to develop new product features and to improve the performances of current production processes.

Companies C and E implemented technological innovation by integrating their ERP system with automated warehouse management, production management, and delivery scheduling. Instead, companies A, B and D adopted a proprietary ERP system, using it only for routine administrative and accounting operations. Companies A and E developed innovation by implementing automation into manufacturing and warehousing processes. Company C recently invested in online connected machines for production. Moreover, it recently developed an integrated barcode data collection to fasten production and warehousing operations.

Concerning risk management within the companies, except for company E, the interviewed companies did not have a specific figure for risk management and the company's owner also made risk management decisions. However, companies A, B and E developed an internal process of risk evaluation and allocate a variable budget to manage risks. On the other hand, companies C and D did not allocate any money for it, as they preferred "to make investments to manage risks only after their occurrence".

Table 2: Resilience enablers for SMEs

	Entrepreneurial orientation	**Technological orientation**	**Risk management culture**
Case A	Engagement in product and market innovation	Basic use of the ERP system Automated manufacturing and warehousing	The CEO handles risk management decisions Variable budget allocation
Case B	Engagement in product and market innovation	Basic use of the ERP system	The CEO handles risk management decision Variable budget allocation
Case C	Engagement in product and market innovation	Advanced use of the ERP system Online connected machines in production Automated warehouses	The CEO handles risk management decisions No budget allocation
Case D	No engagement in product and market innovation	Basic use of the ERP system	The CEO handles risk management decisions No budget allocation
Case E	Engagement in product and market innovation	Advanced use of the ERP system. Automated manufacturing and warehousing	The supply chain director handles risk management decisions Variable budget allocation

4.2 Coping appraisal

Examining the three specific resilience strategies through which companies develop dynamic capabilities, all companies (except company C) deemed that visibility allowed them to anticipate disruptions. All companies,

except company C and D, found the costs incurred to sustain the implementation of visibility strategies acceptable. Company A, B, and E implemented visibility on internal processes by establishing centralized information flows managed through emails, regular meetings, and shared spreadsheets among departments. Companies C and D relied on the already in-house ERP system. These companies were fine with limited visibility on their internal processes due to partially centralized information flows and they did not implement specific strategies to improve it. Company A developed strategies to improve visibility also with supply chain partners, such as daily updates with suppliers, tracking of customers' orders, and centralized supply chain information flows. Although they would have wanted to develop it further, companies B and E had marginal visibility on the supply chain partners' actions due to the partners' unwillingness to share information. At least, companies C and D declared to not implement specific strategies to improve visibility with suppliers or customers in their networks.

All companies, except company D, declared that implementing agility allowed them to anticipate disruptions and they motivated the need to financially invest in it. Companies A, B, C, and E implemented agility in the internal decision-making process by establishing medium- and short-term strategic planning with quarterly or weekly reviews. Moreover, companies A, B, and C deemed that setting up an unstructured decision-making process, in which risk management decisions are taken jointly by CEO, the department managers, and administration, had a positive influence on their agility. At the supply chain level, companies A, B, C and E declared to achieve agility in supply chain processes thanks to a rapid response to changes by their partners.

All the interviewed companies believed that implementing flexibility allowed them to anticipate disruptions and considered it worthwhile to invest in it. Companies A, B, C implemented flexibility into productive processes by setting up flexible production scheduling, flexible product-to-machine allocation, and relaying on additional production capacity to use in the case of need. All the interviewed companies relied on flexible manpower in terms of the number of working hours and interchangeability of roles (multi-skilled manpower). Furthermore, companies B and C internalized some critical manufacturing processes to enhance their flexibility in production. As regards flexibility in supply chain processes, company A is the only one reaching flexibility on suppliers' orders due to the possibility to finance suppliers' machinery in case of need. Even if they would have to develop it more, companies B, C, D and E declared to have difficulties implementing external flexibility due to limits in modifying suppliers' orders in the case of last-minute changes or due to the lack of multiple suppliers. To be flexible, the interviewed companies undertook long-term transformations in the organization of the workforce (companies A, B, C, D, E) and in the procurement process (company A).

Table 3: Coping appraisal

	Supply chain visibility (sensing)	**Supply chain agility (seizing)**	**Supply chain flexibility (reconfiguring)**
Case A	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of visibility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of agility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of flexibility strategies
Case B	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of visibility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of agility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of flexibility strategies
Case C	Not seen as effective to anticipate disruption Implementation cost is not acceptable No implementation of visibility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of agility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of flexibility strategies
Case D	Seen as effective to anticipate disruption Implementation cost is not acceptable No implementation of visibility strategies	Not seen as effective to anticipate disruption Implementation cost is not acceptable No implementation of agility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of flexibility strategies
Case E	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of visibility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of agility strategies	Seen as effective to anticipate disruption Implementation cost is acceptable Implementation of flexibility strategies

4.3 Threat appraisal

Companies A and B declared to perceive themselves as extremely vulnerable to supply and demand risks, whereas C, D and E deemed they were moderately vulnerable to them. Within supply risks, the interviewed companies unanimously agreed that the risk of shortages of raw materials or product components was the most relevant. Whereas fluctuations in demand and diversification were perceived as the strongest risks by the respondents on the demand side.

Companies A, B and E declared that the costs associated with potential physical and economic damages due to supply and demand risks were important. For this reason, they believed that it was worth investing in further enhancing visibility, agility, and flexibility. Company C believed that investing in developing visibility, agility and flexibility was effective only to deal with high probability risks as the severity of the damages caused by them would cost a lot. As consequence, company C would finance more only agility and flexibility. Finally, Company D believed that the potential economic and physical damage associated with all types of threats was mostly acceptable. In fact, Company D would only finance greater flexibility.

Table 4: Threat appraisal

Case A	Extremely vulnerable to supply and demand risks High physical and economic damages due to risks Future empowerment of visibility, agility, flexibility
Case B	Extremely vulnerable to supply and demand risks High physical and economic damages due to risks Future empowerment of visibility, agility, flexibility
Case C	Moderately vulnerable to supply and demand risks Moderate physical and economic damages due to risks Future empowerment of agility and flexibility
Case D	Moderately vulnerable to supply and demand risks Moderate physical and economic damages due to risks Future empowerment of flexibility
Case E	Moderately vulnerable to supply and demand risks High physical and economic damages due to risks Future empowerment of visibility, agility, flexibility

5. Discussion

5.1 Resilience enablers for SMEs

Four out of the five companies present family management, which gave us the opportunity to confirm that the figure of the owner and its involvement in the management of the company has a crucial influence on the openness towards technology innovation and innovation in general (Al-Hakimi and Borade, 2020). The analysis confirms that the openness to innovation, in terms of both technologies (Mandal 2019) and processes to improve the organization's performances, is the engine that allows companies to develop resilient dynamic capabilities to be ready, responsive, and flexible to face all kinds of events (Al-Hakimi and Borade 2020). In fact, where the entrepreneurial orientation is weaker, as it happens in Company D, there are more difficulties in developing innovativeness and dynamic capabilities. Moreover, the evidence that most of the interviewed companies invest in resources to support themselves with technological aids to enhance their resilience is in contrast with the limitation in resources outlined by literature as an obstacle to developing resilience (Babu et al., 2021; Bak et al., 2020).

As concerns the development of a risk management function within the organization, the companies which deem it strongly important to invest in preventive actions properly assign a budget to risk management, which is mostly variable, and make investments in this direction. While those companies that prefer to adopt reactive measures to deal with risks do not have a budget allocated to risk management and do not make investments in it. This confirms the influence of the development of a risk management culture on resilience in SMEs (Kumar and Anbanandam, 2020): whenever there is a risk management culture and supply chain disruption orientation companies are more aware of disruptions and can cope better with them (Bahrami and Shokouhyar, 2022).

5.2 Dynamic capabilities and PMT

The analysis illustrates how SMEs take proactive actions to deal with risks by combining the dynamic capabilities theory with the PMT lens.

Generally, results confirm that investing in visibility, agility and flexibility allows companies to develop resilience through the dynamic capabilities of sensing (i.e., detecting possible threats), seizing (i.e., capturing the sensed threats) and reconfiguring (i.e., aligning or realigning assets to react to the detected threats) (Kähkönen et al., 2021, Queiroz et al., 2022). The study suggests also that the SMEs implement visibility, agility, and flexibility strategies in line with the literature. Visibility is developed within the company and along the chain mainly through information sharing and connectivity with supply chain partners (Kilubi, 2016); agility is developed through periodic strategic planning reviews and the implementation of an internal unstructured decision-making process (Munch and Hartmann, 2022); flexibility is achieved by introducing additional productive capacity and multi-skilled manpower (Negri et al. 2022; Shekarian and Mellat Parast, 2020).

Findings highlight the appropriateness of the PMT as theoretical lens to explain why companies decide to proactively enhance their resilience as dynamic capability by investing into the development of visibility (i.e., sensing), agility (i.e., seizing), and flexibility (i.e., reconfiguring). Indeed, from the combined evaluation of coping and threat appraisals, it emerges that companies adopt three main approaches to developing resilience. The first approach is implemented by companies A, B, and E in developing visibility, agility, and flexibility; by company C in developing agility and flexibility; and by company D in developing flexibility. In this case, dynamic capabilities are considered effective in dealing with possible risks and the evaluation of both their implementation costs (coping appraisal) and the costs caused by the damaging event (threat appraisal)

produced, as a result, the decision to implement them and even to enhance them in the future.

Our findings also highlight that, despite limits in financial resources compared to large firms (Jayaram et al., 2014), SMEs can invest in the development of dynamic capabilities to proactively build resilience. Moreover, the study reveals that flexibility is the most financed dynamic capability and that SMEs implemented long-term transformation to implement it. The development of long-term reconfigurations disputes the assumption that SMEs predominantly adopt reactive or short-term measures to mitigate risks after the occurrence (Bak et al., 2020).

A second approach is represented by company C in developing visibility and by company D in developing agility. These companies deem the implementation of visibility and agility are not sufficient to effectively address threats and they do not see it worth the cost to support their implementation compared to the cost of physical and economic damages caused by potential risks. Strategies to develop dynamic capabilities are not adopted and will not be in the future.

The last approach is the one adopted by company D towards the development of visibility. Even if this capability is deemed effective to cope with risks, its cost is still not justified compared to that of potentially damaging events. As result, the evaluation process of coping and threat suggests that company D should not invest in the development of this capability.

The three detected approaches confirm that within PMT the evaluation of the elements of both coping and threat has as a result the decision to take or not preventive actions (Bode et al., 2021). The elements that emerged as crucial in the evaluation processes are the effectiveness of the measure to cope with the risk and the severity of the risks. The effectiveness of the proactive measure makes it appealing to companies, but its implementation cost is justified only if it is lower than that of the damages caused by the potential threat. The application of the PMT highlights that the evaluation of the cost to implement proactive measures can be done "a-priori" before the occurrence of the potential damaging event, or "a posteriori", after the occurrence of the disruption. Downstream, consideration of costs leads to an overall assessment that drives the decision of implementing or not a proactive action.

6. Conclusions

Through the elements in the analysis, including SMEs' resilience enabling factors such as entrepreneurial orientation, technological innovation, and the development of a risk management culture, we aim to help companies develop a more critical understanding of factors facilitating the establishment of resilience as dynamic capability.

Theoretically, our work advances previous knowledge on the topic by using PMT to improve the current understanding of supply chain resilience for SMEs. The PMT is a valuable lens to investigate the type of approach of SMEs to deal with risk management, shedding light on the elements appraised by a company when choosing whether to adopt a proactive or a reactive approach. The PMT has been combined with dynamic capabilities theory to explain how SMEs develop resilience. Visibility, agility, and flexibility have been confirmed to be appropriate attributes to measure resilience through the dynamic capabilities of sensing, seizing, and reconfiguring. Through the investigation of the resilience enabling factors, our work provides evidence of the positive relationship between the development of resilience and the presence of specific behaviours and orientations within SMEs (i.e., entrepreneurial orientation, technology orientation and risk management culture).

Practically, this study enlightens SMEs on the options they have to deal with risks. SMEs can learn which are the main elements to be evaluated when considering whether to take proactive actions. Whether they decide to proactively develop resilience, they can be informed on the different visibility, agility, and flexibility strategies they can develop. While companies which prefer reactive measures can be informed of the benefits of adopting a proactive approach. At least, SMEs can be made aware of the influence that entrepreneurial orientation, innovativeness, and risk management culture have on the development of their resilience.

The study is not exempt from limitations. As concerns the development of the theoretical framework adopted, our study is largely based on the work of Lee and Rha (2016), linking the dynamic capabilities of sensing, seizing, and reconfiguring to the resilience strategies of visibility, agility, and flexibility. Future research could strengthen these links and further explore resilience strategies related to different dynamic capabilities. Moreover, notwithstanding the number of interviewed companies represents an adequate sample for conducting case studies, it could be interesting to expand the sample of analysis on an international level. This would allow identifying whether there are differences among countries in the mindset and type of approach to deal with risks.

References

Al-Hakimi, M.A. and Borade, D.B. (2020). The impact of entrepreneurial orientation on the supply chain resilience. *Cogent Business and Management*, 7 (1), p. 1847990.

Babu, H., Bhardwaj, P., and Agrawal, A.K.. (2021). Modelling the supply chain risk variables using ISM: a case study on Indian manufacturing SMEs. *Journal of Modelling in Management*, 16, pp. 215–239.

Bode, C., Macdonald, J.R., and Merath, M. (2022). Supply disruptions and protection motivation: Why some managers act proactively (and others don't). *Journal of Business Logistics*, 43, pp. 92–115.

Bak, O., Shaw, S., Colicchia, C., and Kumar, V. (2020). A systematic literature review of supply chain resilience in small–medium enterprises (SMEs): a call for further research. IEEE Transactions on Engineering Management.

The full list of references is available at:

https://docs.google.com/document/d/1yVfWuATs3mZcsdg3B-HOPGnGmD1nnIZk/edit?usp=sharing&ouid=118389272958910488501&rtpof=true&sd=true